

Microbiology of vaginal discharge in Nairobi, Kenya

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SUMMARY Among women attending a sexually transmitted disease (STD) clinic in Nairobi with vaginal discharge, *Neisseria gonorrhoeae* and *Chlamydia trachomatis* were isolated from the cervix in 32 (26%) of 122 and four (7%) of 58 women respectively. Infection with *Trichomonas vaginalis*, *Candida albicans*, *Gardnerella vaginalis*, and *Mycoplasma* spp were diagnosed in 42 of 122 (34%), 26 of 110 (24%), 75 of 100 (75%), and 42 of 89 (47%) women respectively. Mixed infections with at least two pathogens were found in 23 (26%) of 89 women examined for all microorganisms. Infection with *N gonorrhoeae* was significantly associated with abdominal pain.

Introduction

Vaginal discharge, the major sign of vaginitis, is the most common presenting feature in women attending sexually transmitted diseases (STD) clinics. Reliable data on the occurrence and aetiology of vaginitis in developing countries are virtually non-existent. Information on female genital infections in Africa relates to women who attend antenatal and family planning clinics¹⁻⁴ and to prostitutes.⁵ Data on infection with *Gardnerella vaginalis* and *Chlamydia trachomatis* and *Mycoplasma hominis*, two potential causes of pelvic inflammatory disease (PID), were not available.

Complications of genital tract infections such as pelvic inflammatory disease and its sequelae are common in Kenya.⁶⁻⁸ For rational management and prevention of these complications, it is necessary to know which pathogens are involved in uncomplicated infections. This study was therefore carried out to determine the incidence of infection with *Neisseria gonorrhoeae*, *C trachomatis*, *Trichomonas vaginalis*, *Candida albicans*, *G vaginalis*, and *Mycoplasma* spp in women with vaginal discharge attending a clinic for sexually transmitted diseases in Nairobi, Kenya.

Patients and methods

One hundred and twenty-two consecutive unselected patients who attended Nairobi city council's STD clinic during two weeks in January 1982 complaining

of vaginal discharge were studied. A gynaecological history including questions on the character of the discharge, abdominal pain, and dysuria was taken.

Specimens for culture of *N gonorrhoeae* and *C trachomatis* were collected from the cervical os and from the posterior fornix (for other microorganisms). All culture media were inoculated immediately in the clinic. Specimens for chlamydial culture were placed into sucrose phosphate buffer transport medium. For the detection of clue cells a saline mount of vaginal material from 100 women was made. Direct microscopy for infection with *T vaginalis* was performed in all 122 patients; this protozoan was identified as a mobile flagellate. Secretions from each woman were cultured for *N gonorrhoeae* on Thayer-Martin medium (122 patients), for *C albicans* on Sabouraud's dextrose agar (110 patients), for *G vaginalis* on human bilayer medium (100 patients),⁹ for *C trachomatis* on cycloheximide treated McCoy cells (58 patients),¹⁰ and on mycoplasma medium (89 patients).¹¹ Plates for *N gonorrhoeae* and *G vaginalis* and mycoplasmas were incubated in 5% CO₂ in a candle extinction jar for up to 48 hours. Suspected colonies of *N gonorrhoeae* were identified by oxidase reaction and Gram stain and tested for β -lactamase production by the nitrocefin method.¹² *Candida* spp were identified as *C albicans* by germ tube formation. *G vaginalis* was identified as described.¹³ *Mycoplasma* colonies were identified by their typical "fried egg" appearance under the microscope on application of Diene's stain to the colonies; they were not identified to species level.

STATISTICAL ANALYSIS

For statistical analysis, the χ^2 test with Yates's correction and Fisher's exact test were used.

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Accepted for publication 14 December 1982

Results

Most women examined were between 20 and 29 years old with a mean age of 23 years. *N gonorrhoeae* was isolated from 32 of the 122 patients and occurred more frequently (13 of 98 women) in women who were under 20 years of age (table I). This difference was not, however, significant ($\chi^2 = 1.26$). *N gonorrhoeae* was not found in women of 30 years or older ($p = 0.015$, Fisher's exact test). None of the *N gonorrhoeae* isolates produced β -lactamase. There was no significant difference in the age specific isolation rate for the other microorganisms.

The relationship of abdominal pain to the genera and species isolated is shown in table II. *N gonorrhoeae* was isolated in 41% of women with abdominal pain compared with 19% of those without ($\chi^2 = 5.41$, $p = 0.02$). Chlamydiae were also more frequently isolated in patients with abdominal pain, but the numbers were too small for statistical analysis. The reverse occurred for genital mycoplasmas, as they were isolated significantly more frequently (in 31 of 47 women) in patients who did not complain of abdominal pain. Cervical erosion and dysuria were found in 71 and 21 women respectively with vaginal discharge. Either alone or together these conditions were not significantly associated with any particular organism. Other findings included scars of healed genital ulcers in eight women, one of whom had a bubo as well. One patient had a Bartholin's abscess, one vulval condylomata, and one labial ulceration.

Clue cells were found in 70 of the 100 women examined and were always associated with isolation of *G vaginalis*. This organism was isolated from 25 (83%) of 30 patients in whom no other pathogen was identified compared with 35 (70%) of 50 of the other women (difference not significant). There was an inverse relationship between *G vaginalis* and *C albicans*; when the second was isolated only 50% of the patients also harboured *G vaginalis* compared with 80% of women who did not have candidosis ($p = 0.04$, Fisher's exact test). Mixed infections with at least two pathogens, but not *G vaginalis*, were found in 23 (26%) of 89 women who were examined for all microorganisms.

TABLE II Micro-organisms isolated from patients with vaginal discharge with or without abdominal pain. (Figures are number of positive cultures/number of patients tested with percentage of positives in parentheses)

Organism isolated	Abdominal pain	
	Present	Absent
<i>N gonorrhoeae</i>	16/39 (41)	16/83 (19)*
<i>T vaginalis</i>	13/39 (33)	29/83 (35)
<i>C albicans</i>	7/36 (19)	19/74 (26)
<i>G vaginalis</i>	27/35 (79)	48/65 (74)
<i>C trachomatis</i>	2/19 (11)	2/39 (5)
Genital mycoplasmas	11/42 (26)	31/47 (66)†

* $\chi^2 = 5.41$, $p < 0.02$

† $\chi^2 = 12.52$, $p < 0.001$

Discussion

This survey illustrates the complex aetiology of vaginal discharge among STD patients in Africa, in whom one quarter were infected with at least two genital pathogens.

The incidence of *N gonorrhoeae* was much higher than that reported in antenatal and family planning clinic patients in other African countries where 2-12% of the women examined had gonorrhoea.¹⁻⁴ The rate of isolation of *N gonorrhoeae* was, however, only slightly higher than that among asymptomatic family planning clinic attenders in Nairobi in 1973, when the prevalence was 19.5%.¹ In a similar study in 1982 and using the same culture methods 17% of women attending a family planning clinic in Nairobi had gonorrhoea.¹⁴ Both family planning and STD clinic patients seemed to be an important reservoir of gonococcal infection in Nairobi.

In this series gonorrhoea was significantly associated with low abdominal pain. This suggests that PID was probably present. The simplest method of managing vaginal discharge would be for women with abdominal pain to be treated immediately for gonorrhoea, while the rest may be treated appropriately when the results of laboratory investigations are available. In most instances, however, no such facilities are available, and as the

TABLE I Micro-organisms isolated from patients with vaginal discharge in Nairobi by age group

No of women harbouring:						
Age (years)	<i>N gonorrhoeae</i> (n = 122)	<i>T vaginalis</i> (n = 122)	<i>C albicans</i> (n = 110)	<i>G vaginalis</i> (n = 100)	Genital mycoplasmas (n = 89)	<i>C trachomatis</i> (n = 58)
≤19	13/98	17/38	7/34	20/33	12/28	1/10
20-29	19/71	21/71	19/65	50/60	26/54	2/40
≥30	0/13	4/13	0/11	5/7	4/7	1/8
Total (%)	32 (26)	42 (34)	26 (24)	75 (75)	42 (47)	4 (7)

overall prevalence of gonorrhoea is over 20% standard treatment for gonorrhoea should be given initially, as proposed by Meheus.¹⁵ The rationale for treating gonorrhoea first is to prevent the development of its debilitating complications primarily PID. If *C trachomatis* proves to be as important a cause of these complications in Kenya as *N gonorrhoeae*, these recommendations may have to be modified.

The cervical infection rate of *C trachomatis* was lower than in STD clinic attenders in Europe and North America where chlamydiae may be isolated from the cervix of 12-31% of women seen in STD clinics.¹⁶ The prevalence of genital chlamydia infections was similar to that found in family planning and antenatal clinic patients in Nairobi,¹⁴ but was lower than among women with symptoms of genital tract infection in Gambia.¹⁷ The fairly low isolation rate of *C trachomatis* contrasts with the high prevalence of gonorrhoea. We have found, however, that sera from 90% of various groups of women in Nairobi contained antichlamydial IgG antibodies indicating that chlamydial infections were extremely common in that population.¹⁴ A similar pattern of chlamydial infection has been found among black women in South Africa.¹⁸ Further research is needed on the role of genital chlamydial infections in such conditions as PID, infertility, and puerperal and perinatal morbidity in Kenya.

Trichomoniasis was the most frequent infection diagnosed. The incidence of this infection in the population studied is higher than that reported in studies of antenatal clinic attenders in Nigeria and in Swaziland^{2,4} and of family planning clinic attenders in Nairobi, where the respective figures were 20.7%, 23.3%, and 25.8%.¹ A very high prevalence rate of *G vaginalis* infection was found in this population, and that together with a high prevalence of other coexistent genital infections may have weakened any relationship between *G vaginalis* and non-specific vaginitis.

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